Visualisation tools at KNMI

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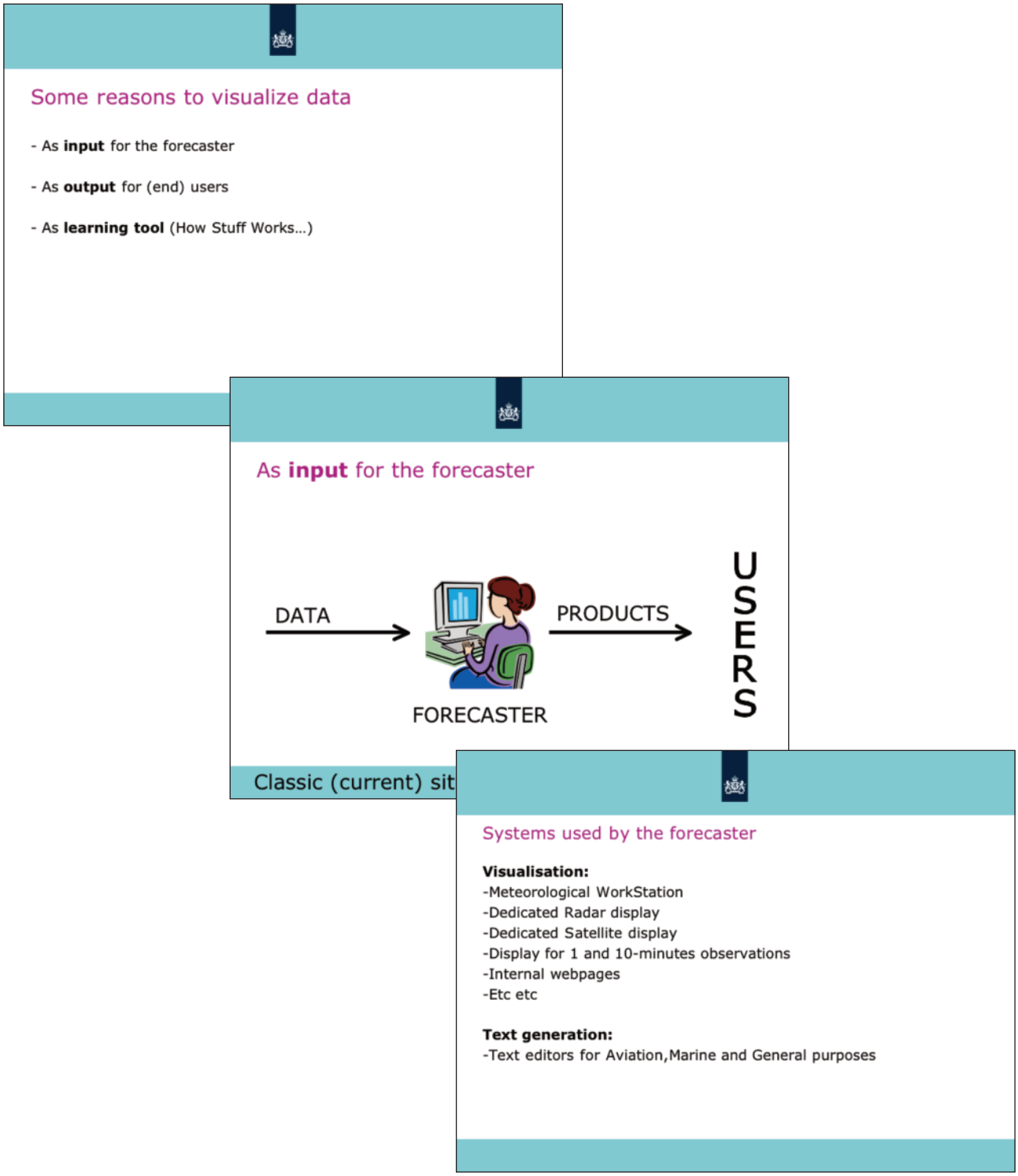
KNMI operational forecasters have a number of systems available for the visualisation of data: a general purpose Meteorological WorkStation (MWS), dedicated systems for satellite data, radar data, and special observations. A growing amount of data is presented with web-applications and this is the way KNMI likes to visualize as much as possible: a new MWS has to be modular and web based. A complex type of visualisation is 3D stereoscopic presentation of model data. KNMI is developing a tool to present the output of numerical models 3D stereoscopic in our 3D-lab as a learning tool for both developers and forecasters.



Meteorological Work Station

- MWS of 3SI (Spatial Software Solutions Inc, USA)
- Started with Metlab Classic in 1992, operational in 1995
- Migration to Smartwindows (KNMI version Metlab2) (2000-2005)
- 'Frozen' since 2007

- 'Standard possibilities':
  - Layers
  - Modeldata
  - Observations
  - Radar
  - Satellite

In 1995 :

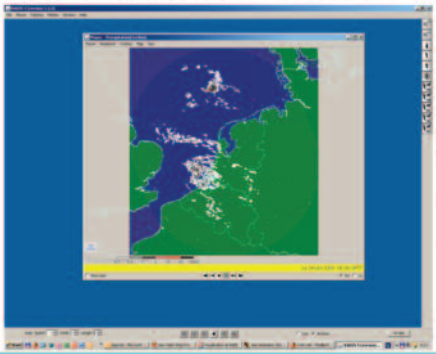
- 1 Head Quarter in De Bilt
- 5 Regional Centres

- 17 Meteorological Work Stations (MWS)

Currently:

- All work centralized in De Bilt, 6 MWS's
- Consultant at Amsterdam Airport, 1 MWS (depending on the weather)

Dedicated Radar display (Web enabled)

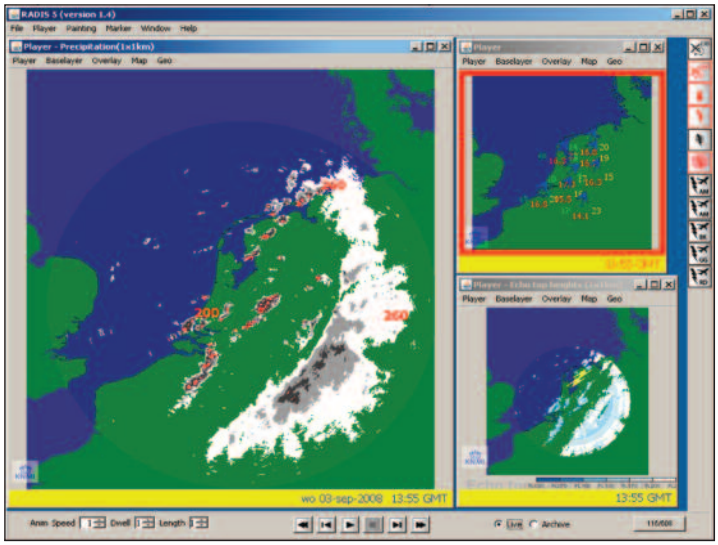


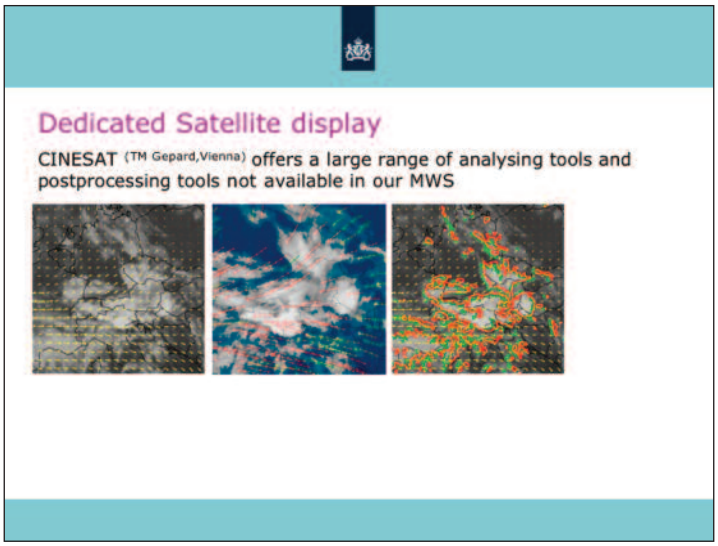
Home made

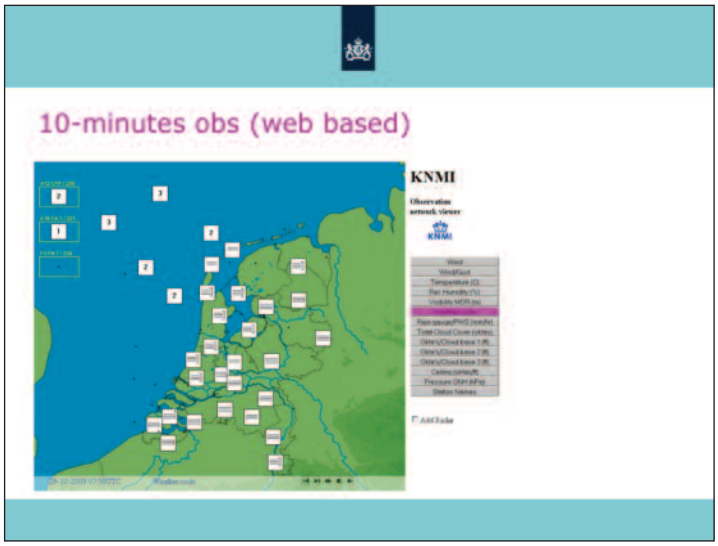
-Precipitation
- extrapolation
- Lightning
- Hail risk
- Echo top heights

- European composite

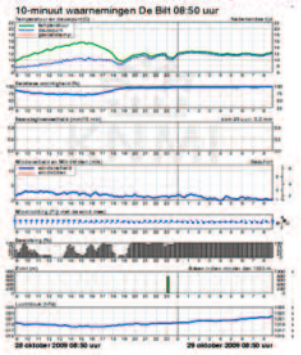
- Multiple synchronised players


RADIS 5 (version 1.4)
Player - Precipitation(1x1km)
wo 03-sep-2008 13:55 GMT
13:55 GMT


Dedicated Satellite display
CINESAT (TM Gepard,Vienna) offers a large range of analysing tools and postprocessing tools not available in our MWS


10-minutes obs (web based)
KNMI

10-minutes obs (web based)



Many new products developped by enthousiastic model developers:

- Images produced at their own workstation
- Easy to display with a browser
- Easy loops with a script

No formal request necessary to implement in MWS, just available....

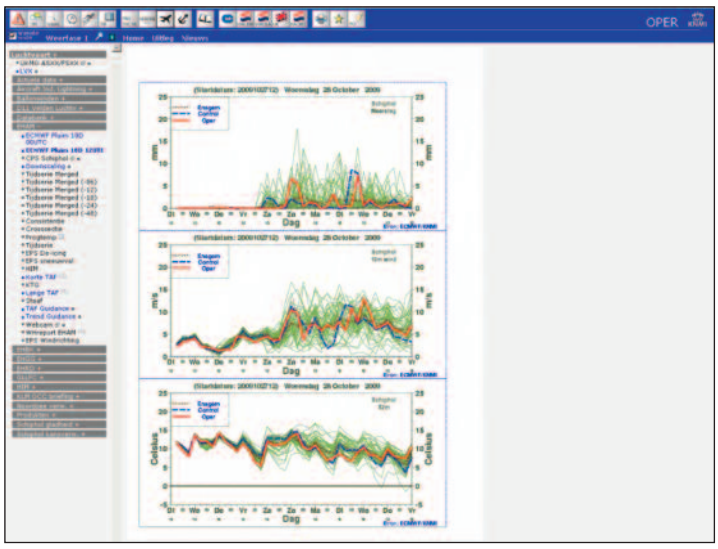
However...

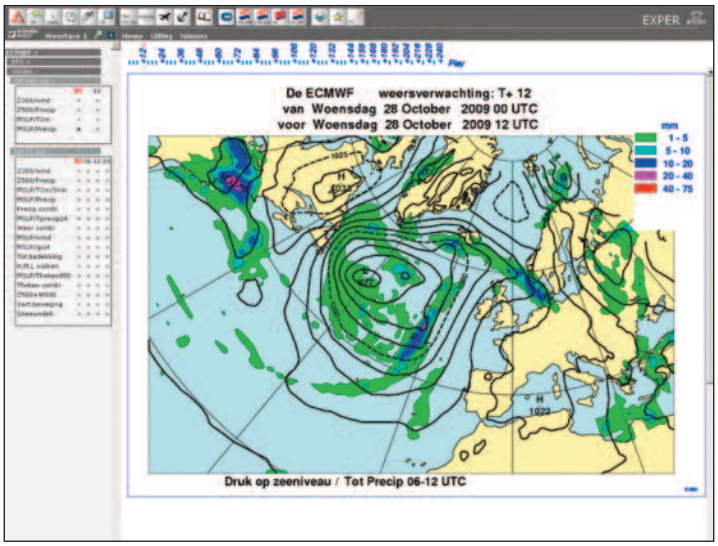
- State of product (Operational or Experimental) not visible for forecaster
- Menu structure necessary
- Possibilities for easy maintenance required

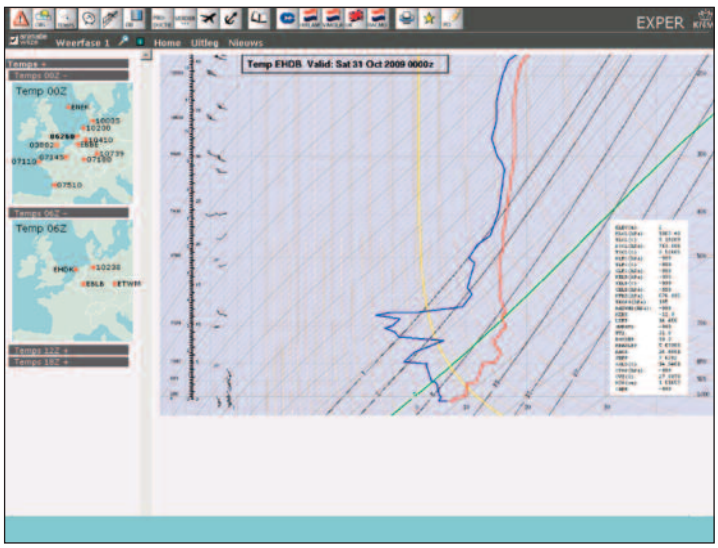
Solution:

-Portal to individual images/web pages

- Small MySql database
- All links defined in a product table with state (OPER/EXPER)
- Menu structure defined in tables


OPER
Dag
mm
m/s
Celsius


EXPER
De ECMWF weersverwachting: T+ 12
van Woensdag 28 October 2009 00 UTC
voor Woensdag 28 October 2009 12 UTC
mm
1 - 5
5 - 10
10 - 20
20 - 40
40 - 75
H
1022
Druk op zeeniveau / Tot Precip 06-12 UTC


EXPER
Weerfase 1
Home
Uitleg
Nieuws
Temp EHDB Valid: Sat 31 Oct 2009 0000z
Temp 00Z
Temp 06Z

Pros and Cons pre-processed images

-Pros
- Distributed production
- Easy to use in portal
- Easy archiving

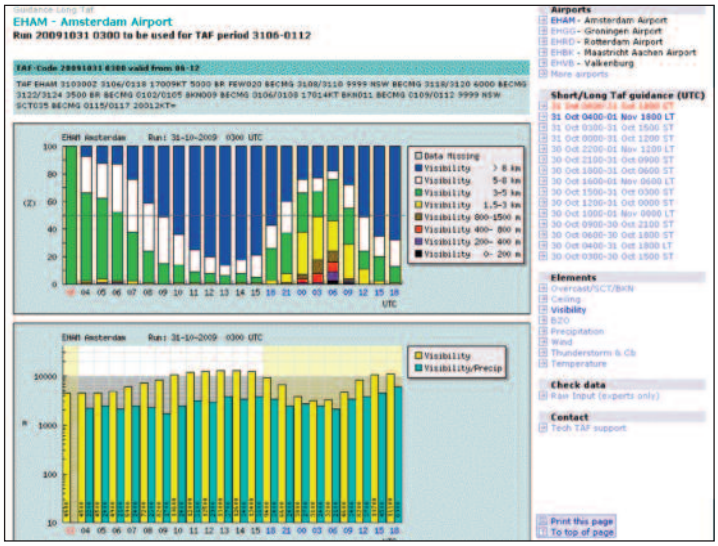
-Cons
- The pre-processing

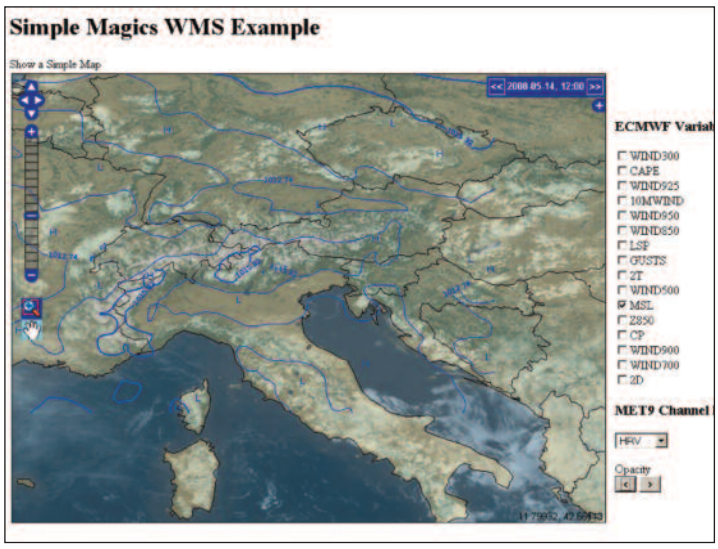
Alternative

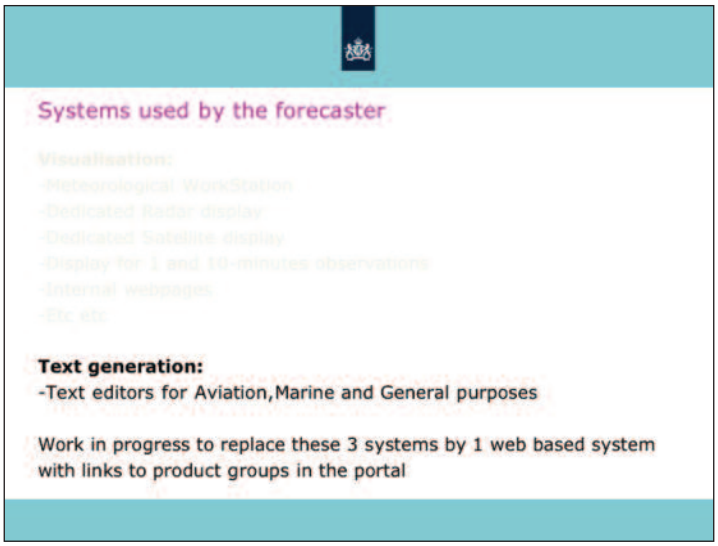
-On demand visualisation

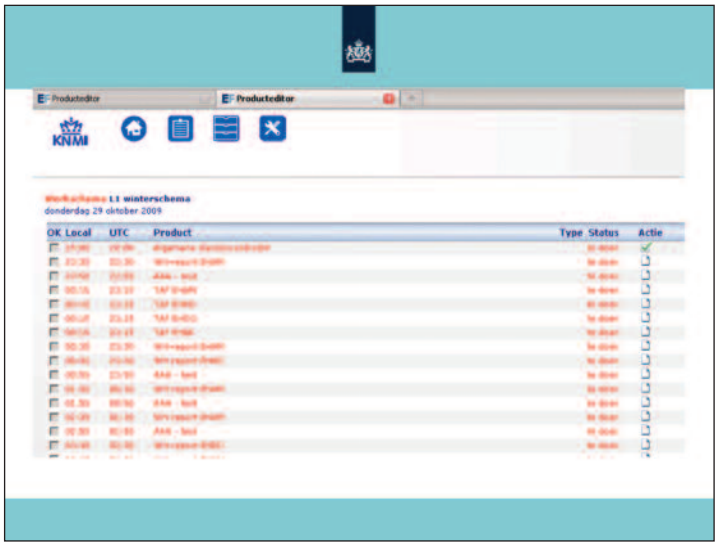
Operational web application (PHP,JpGraph) in use at KNMI:
- Guidance for TAF
- Guidance for TREND
- Guidance for road temperature

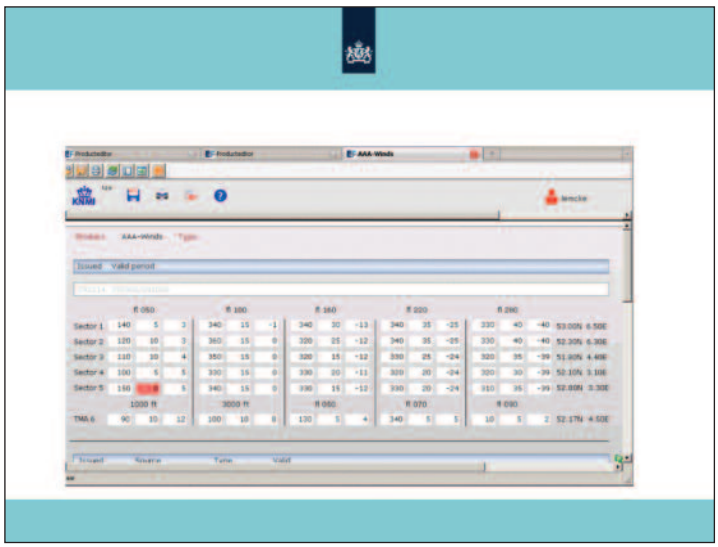
In 2008 experiment with on demand processing with
- MAGICS++
- Web Mapping Server
- Cinesat satelite images
- Radar images

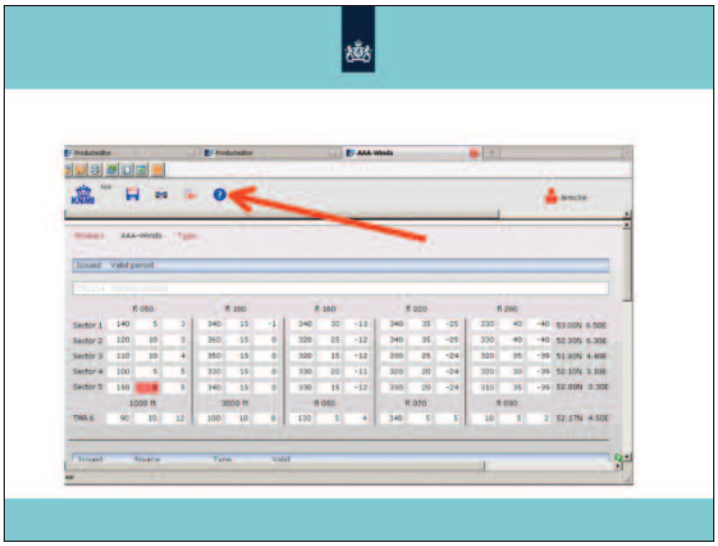


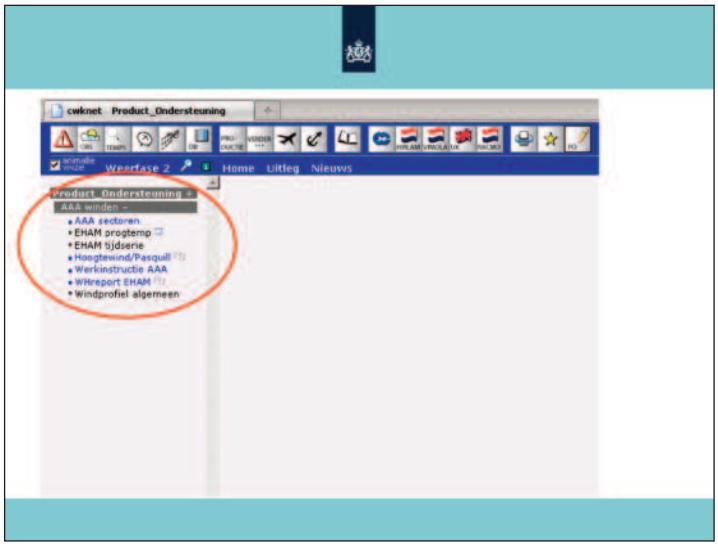

Simple Magics WMS Example
Show a Simple Map
ECMWF Variab
WIND300
CAPE
WIND925
10MWIND
WIND950
WIND850
LSP
GUSTS
2T
WIND500
MSL
Z850
CP
WIND900
WIND700
2D
MET9 Channel
HRV
Opacity


Systems used by the forecaster
Visualisation:
-Meteorological WorkStation
-Dedicated Radar display
-Dedicated Satellite display
-Display for 1 and 10-minutes observations
-Internal webpages
-Etc etc
Text generation:
-Text editors for Aviation,Marine and General purposes
Work in progress to replace these 3 systems by 1 web based system with links to product groups in the portal


Producteditor
Producteditor
KNMI
donderdag 29 oktober 2009
OK Local UTC Product Type Status Actie






cwknet Product_Ondersteuning
Weerfase 2
Home
Litteg
Nieuws
Product Ondersteuning
AAA sectoren
EHAM progtemp
EHAM tijdserie
Hoogtewind/Pasquill
Werkinstructie AAA
WHreport EHAM
Windprofiel algemeen

For forecast times > 1 day :

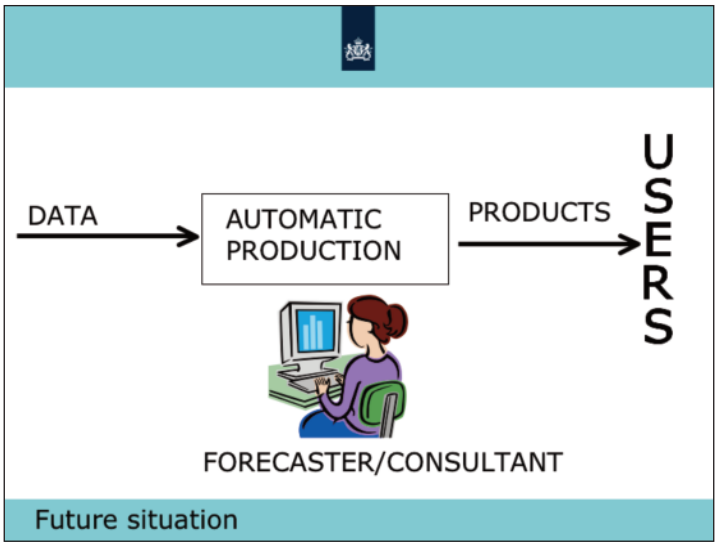
- we use NWP-models directly in the output

For forecast times < 1 day :

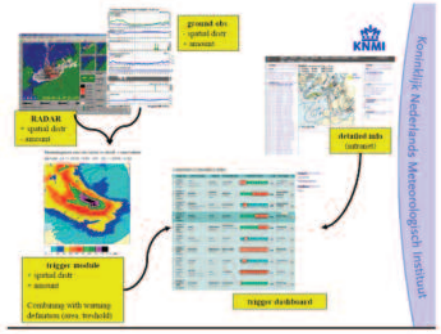
In the future direct use of:

- high resolution models
- statistical postprocessing
- short term EPS

This will change the role of the forecaster in the near future

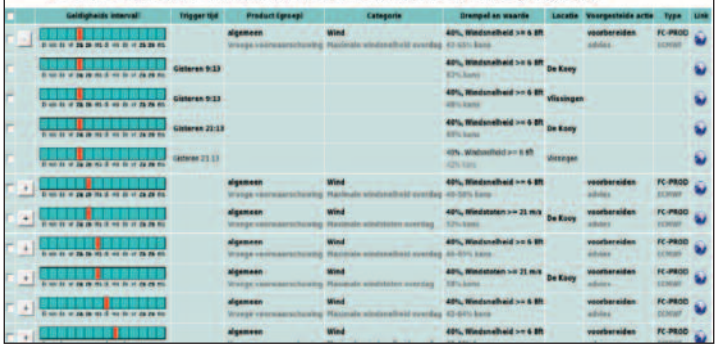


Showed in 2007 at ECMWF by Marcel Molendijk



Metaphor with airplane

- Fly on automatic pilot when possible
- Dash board with information and automatic alarms (triggers)



Some reasons to visualize data

- As **input** for the forecaster
- As **output** for (end) users
- As **learning tool** (How Stuff Works...)

As **output** for (end) users

- Currently limited amount of graphical info at our public web
- A bit more at the non-public websites (closed user groups)

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- As **output** for (end) users

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As **learning tool with old data**

- Load data of an archived case in MWS

- Severe Weather Catalogue:
  Collection with all kind of information about cases with severe weather in the past.

  One of the offline task of the forecasters is to fill the database with relevant data.
  It starts with the February 1953 flooding.

- Use the ArchiveViewer

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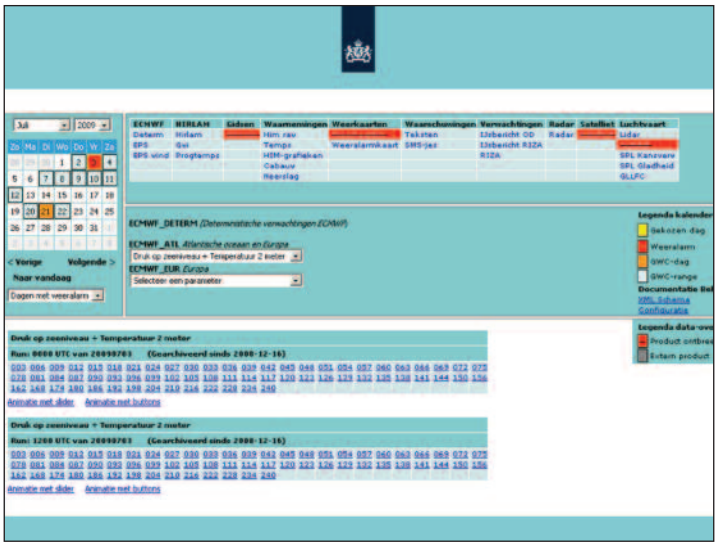
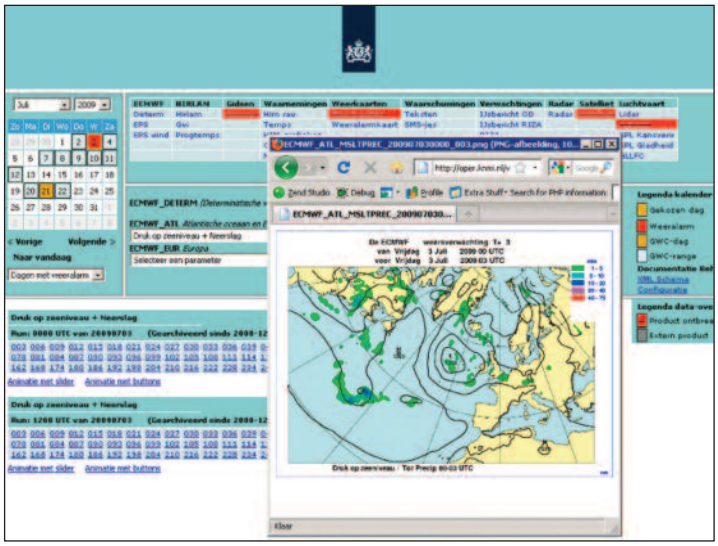
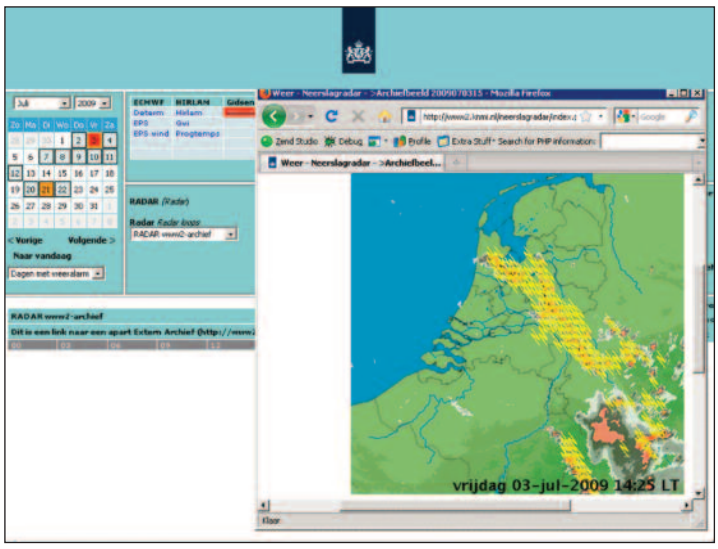






As **learning tool** (How Stuff Works…)

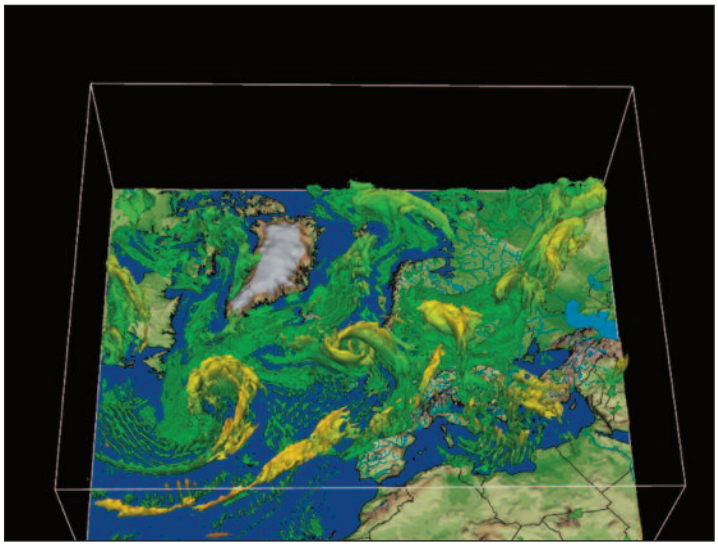
In 2008 KNMI started a project for **3D-stereoscopic** visualisation

3D-LAB

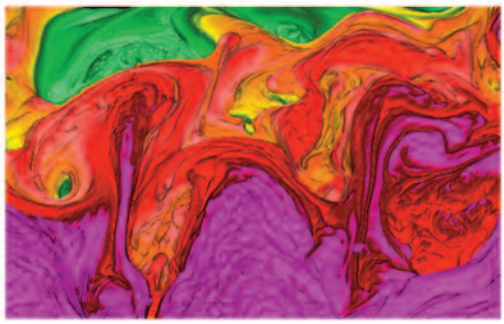
- HIRLAM 3D-viewer available now
- HARMONIE 3D-viewer at the end of the year

Purpose:

To develop a learning tool for both model developpers and forecasters



Potential Vorticity colored with Theta-w



Conclusions

-Most tools for the forecaster will be webbased in the future

-Automatic forecast when wheather permits, manual adaption when necessary

-Forecaster more and more consultant

-3D-stereographic presentation of numerical models is exiting